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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/043,227	01/14/2002	Juing Fang	Q68098	6193
7590 04/05/2005			EXAMINER	
SUGHRUE MION, PLLC 2100 Pennsylvania Avenue, NW Washington, DC 20037-3213			GHULAMALI, QUTBUDDIN	
			ART UNIT	PAPER NUMBER
			2637	

DATE MAILED: 04/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/043,227	FANG, JUING	
	<b>Examiner</b>	<b>Art Unit</b>	
	Qutub Ghulamali	2637	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 14 January 2002.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6, 9 and 10 is/are rejected.
- 7) ☒ Claim(s) 7 and 8 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>3/01/02</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 4, 5, 6, 9, 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ramaswamy (US Patent 5,966,412) in view of Heegard (US Patent 5,621,761).

Regarding claim 1, Ramaswamy discloses a method of transmitting QAM-16 modulated digital signals (abstract) in which each of sixteen states represents a symbol with four bits and is represented in a complex plane by a point with particular coordinates (col. 4, lines 5-17), in each quadrant of the complex plane four points represent four numbers each of four bits (fig. 2; col. 5, lines 16-26) in which numbers the last two bits are the same and the first two bits represent numbers that are all different, the numbers are divided into four subsets over the whole of the complex plane, each subset is formed by the set of numbers having the same first two bits, so that the numbers are therefore in the four different quadrants (col. 5, lines 20-43). Ramaswamy, however, is silent regarding "the coordinates of the symbols in the complex plane are chosen so that each subset takes the place of another subset after a rotation of  $\pm K \pi/2$ , where K is an integer".

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Heegard in the same field of endeavor discloses the coordinates of the symbols in the complex plane are chosen so that each subset takes the place of another subset after a clockwise and counterclockwise rotation (0, 90, 180, 270 and 360 degrees) (0,0; 1,0; 1,1; 0,1; 0,0) (col. 8, lines 14-39). Therefore, it would have been obvious to person of ordinary skill at the time the invention was made to use each subset that take place of another subset after rotation of  $\pi/2$  (90 degree) as taught by Heegard in the system of Ramaswamy because it can maintain proper phase shift regardless of where the actual points are in signal space.

Regarding claim 4, Ramaswamy discloses every feature of the claim invention of claim 1, however, Ramaswamy is silent regarding the four-bit numbers to be transmitted are coded using an error corrector code that is transparent to phase rotations in order to add to the symbols transmitted supplementary symbols enabling transmission errors to be corrected at the receiver. Heegard in the same field of endeavor discloses four-bit numbers to be transmitted are coded using an error corrector code that is transparent to phase rotations in order to add to the symbols transmitted supplementary symbols enabling transmission errors to be corrected at the receiver (col. 6, lines 25-40). It would have been obvious to person of ordinary skill at the time the invention was made to use coded signals that is transparent to phase rotations in order to add to the symbols transmitted as taught by Heegard in the circuit of Ramaswamy because it can mitigate transmission of errors to be corrected at the receiver.

Regarding claim 5, Ramaswamy discloses every feature of the claim invention of claim 1, however, Ramaswamy is silent regarding error correction code is a product code and the bits are considered individually with an error corrector code that is transparent to phase rotation. Heegard in the same field of endeavor discloses error correction code is a product code and the

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bits are considered individually with an error corrector code that is transparent to phase rotation (col. 3, lines 9-14, 37-43; col. 5, lines 20-25). It would have been obvious to person of ordinary skill at the time the invention was made to use error correction code as a product code as taught by Heegard in the circuit of Ramaswamy because by doing so the phase uncertainty can be minimized.

Regarding claim 6, Ramaswamy discloses the first two digits of each symbol are coded together and the two digits of each symbol are coded together (col. 3, lines 38-45).

Regarding claim 9, Ramaswamy discloses prior to coding using said error corrector code, two-dimensional differential coding is effected twice (col. 1, lines 15-31; col. 5, lines 11-22).

Regarding claim 10, Ramaswamy discloses QAM-16 digital signals transmission wherein a four-bit symbol is assigned to each signal received according to its phase and its amplitude (col. 1, lines 11-19).

3. Claims 2, 3, are rejected under 35 U.S.C. 103(a) as being unpatentable over Ramaswamy (US Patent 5,966,412) in view of Heegard (US Patent 5,621,761) as applied to claim 1 above, and further in view of Amis et al (IEEE, GlobeCom).

Regarding claims 2 and 3, Ramaswamy and Heegard disclose every feature of the claimed invention to claim 1 above. The combination of Ramaswamy and Heegard however, is silent regarding the succession of said last two bits from one quadrant to another is a Gray succession. Amis in a similar field of endeavor discloses the use of Gray mapping of bits from one quadrant to another (page 1023, col. 2, sections A and B (continue to page 1024)).

Therefore it would have been obvious to a person of ordinary skill at the time the invention was

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made to use Gray mapping as taught by Amis in the system of Ramaswamy and Heegard so as to provide greater spectral efficiency with the modulation process.

*Allowable Subject Matter*

4. Claims 7, 8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

*Conclusion*

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US Patents:

Pahlavan et al (US Patent 4,660,214) discloses a QAM modulated Trellis coded signal structure.

Durrant et al (USP 5,692,007) shows a method and apparatus for differential encoding and decoding in a communications system.

Fazel et al (USP 5,32,342) shows multistage decoder for decoding received signals in adaptive or non-adaptive mode.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Qutub Ghulamali whose telephone number is (571) 272-3014.

The examiner can normally be reached on Monday-Friday from 8:00AM - 5:00PM.

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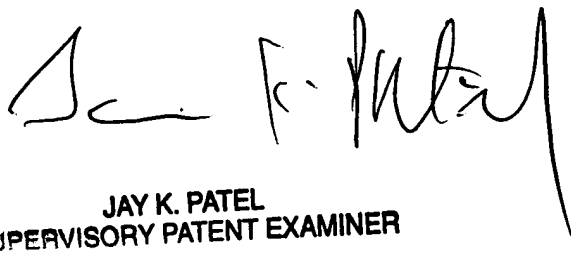
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on (571) 272-2988. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



QG.

March 30, 2005.



**JAY K. PATEL**  
**SUPERVISORY PATENT EXAMINER**